

Impermeable Barrier at the Boundary of the Upper and Middle Earth's Crust

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Open pores and fissures in consolidated crust are closed at the depth of 6-12 km, forming impermeable barrier for fluids. Barrier separates the upper crust from the middle one. Below that barrier fluids raising from metamorphism zones, cooling intrusions and the mantle are under lithostatic pressure. So, according to Terzaghi's law, fluid containing rocks are greatly weakened and easily undergone by hydrofracture. Highpressure fluids accumulate under barrier and break it through upwards only under extremal conditions. Self-sealing of break-through by new minerals generation are going on due to throttle effect of temperature lowering. New data from super-deep boreholes SG-3, KTB and Gravberg confirmed the offered model (Ivanov, 1970, 1998). Owing to Baltic Shield ascent and erosion SG-3 intersected the relict paleozonality: hydrostatic pressure zone, barrier, lithostatic pressure zone and modern barrier at the depth of 6-7 km. KTB could not overcome the spontaneous borehole narrowing in barrier at the depth of 9 km. Barrier as sharp rheological boundary is commonly accompanied by tectonic displacements. Large scale tectonic dislocations and intrusions cause formation of new barrier which superimpose the relict ones. As rheological boundary barrier has a determinant significance for tectonics, it is well observed in regions of the Earth's crust extension. As hydrodynamic boundary barrier determines the development of hydrothermal deposits. It cannot also exclude assumption concerning possible hydrocarbons accumulations under barrier.